

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING OF A CHANGE

(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

MCCALLUM, Graeme, David
Lloyd Wise
Tanjong Pagar
P.O. Box 636
Singapore 910816
SINGAPOUR

LLOYD WISE

06 FEB 2001

RECEIVED

Date of mailing (day/month/year)
29 January 2001 (29.01.01)

Applicant's or agent's file reference
FP1161

IMPORTANT NOTIFICATION

International application No.
PCT/SG99/00050

International filing date (day/month/year)
31 May 1999 (31.05.99)

1. The following indications appeared on record concerning:

☒ the applicant ☐ the inventor ☐ the agent ☐ the common representative

Name and Address

SIEMENS AKTIENGESELLSCHAFT
Wittelsbacherplatz 2
D-80333 München
Germany

State of Nationality

DE

State of Residence

DE

Telephone No.

Facsimile No.

Teleprinter No.

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☒ the person ☒ the name ☒ the address ☐ the nationality ☐ the residence

Name and Address

INFINEON TECHNOLOGIES A.G.
St.-Martin-Strasse 53
D-81669 Munich
Germany

State of Nationality

DE

State of Residence

DE

Telephone No.

Facsimile No.

Teleprinter No.

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

☒ the receiving Office ☐ the designated Offices concerned
☐ the International Searching Authority ☒ the elected Offices concerned
☒ the International Preliminary Examining Authority ☐ other:

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Authorized officer

Dominique DELMAS

Facsimile No.: (41-22) 740.14.35

Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

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Name and Address SIEMENS AKTIENGESELLSCHAFT Wittelsbacherplatz 2 D-80333 München Germany	State of Nationality DE	State of Residence DE
	Telephone No.	
	Facsimile No.	
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Name and Address INFINEON TECHNOLOGIES A.G. St.-Martin-Strasse 53 D-81669 Munich Germany	State of Nationality DE	State of Residence DE
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	

3. Further observations, if necessary:

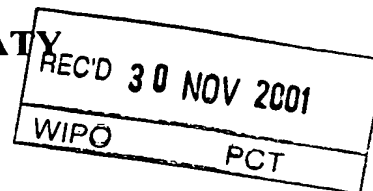
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☒ the International Preliminary Examining Authority
 ☐ other:

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Dominique DELMAS Telephone No.: (41-22) 338.83.38
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PATENT COOPERATION TREATY

PCT



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

4

Applicant's or agent's file reference FP1161	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/SG 99/00050	International filing date (day/month/year) 31 May 1999 (31.05.1999)	Priority Date (day/month/year)
International Patent Classification (IPC) or national classification and IPC IPC⁷: H01L 21/48, 21/50, 23/48, 23/28		
Applicant Siemens Aktiengesellschaft		

<p>1. This international preliminary examination report has been prepared by this International Preliminary Examination Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>4</u> sheets, including this cover sheet.</p> <p><input type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of _____ sheets.</p>	
<p>3. This report contains indications relating to the following items:</p> <p>I. <input checked="" type="checkbox"/> Basis of the opinion</p> <p>II. <input type="checkbox"/> Priority</p> <p>III. <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p>IV. <input type="checkbox"/> Lack of unity of invention</p> <p>V. <input checked="" type="checkbox"/> Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability: citations and explanations supporting such statement</p> <p>VI. <input type="checkbox"/> Certain documents cited</p> <p>VII. <input type="checkbox"/> Certain defects in the international application</p> <p>VIII. <input type="checkbox"/> Certain observations on the international application</p>	

Date of submission of the demand 30 October 2000 (30.10.2000)	Date of completion of this report 17 October 2001 (17.10.2001)
Name and mailing address of the IPEA/AT Austrian Patent Office Kohlmarkt 8-10 A-1014 Vienna Facsimile No. 1/53424/200	Authorized officer MAYER T. Telephone No. 1/53424/452

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SG 99/00050

I. Basis of the report

1. With regard to the **elements** of the international application:*

☒ the international application as originally filed

☐ the description:

pages _____, as originally filed

pages _____, filed with the demand

pages _____, filed with the letter of _____

☐ the claims:

pages _____, as originally filed

pages _____, as amended (together with any statement) under Article 19

pages _____, filed with the demand

pages _____, filed with the letter of _____

☐ the drawings:

pages _____, as originally filed

pages _____, filed with the demand

pages _____, filed with the letter of _____

☐ the sequence listing part of the description:

pages _____, as originally filed

pages _____, filed with the demand

pages _____, filed with the letter of _____

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language _____ which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☐ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in printed form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____.

☐ the claims, Nos. _____.

☐ the drawings, sheets/fig _____.

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/SG 99/00050

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability: citations and explanations supporting such statement

I. Statement	Novelty (N)	Claims 4,10,11	YES
		Claims 1-3,5-9,12	NO
Inventive step (IS)		Claims	YES
		Claims 1-12	NO
Industrial applicability (IA)		Claims 1-12	YES
		Claims	NO

Citations and explanations (Rule 70.7)

The following documents are cited in the Search Report:

D1: US 5,343,073 A
D2: US 5,897,339 A
D3: JP 10251777 A
D4: US 5418189 A

Document D1, which is considered to represent the most relevant state of the art discloses an electronic device in a molded plastic package which is supported by a centrally positioned die attach pad formed from the same material as the electrically conductive metal substrate. An electronic device is electrically interconnected to the lead frame and the lead frame is coated with at least one metallic layer to improve adhesion to a polymer resin. After bonding the electronic device to the die pad and electrically interconnected to the enhanced lead frame, the assembly is encapsulated in a molding resin. A polymer resin is molded about the electronic device and inner leads. Therefore document D1 shows consequently all features of present independent claims 1 and 5 and cannot be considered novel respectively involving an inventive step.

Moreover, document D1 suggests to deposit the layers by any suitable technique such as immersion plating, electrolytic plating or cladding (see Claim 2 of the present application). The lead frame in D1 is coated with at least one metallic layer (chromium, zinc or a mixture thereof, nickel to prevent diffusion of subsequently layers into the metallic substrate). Silver or aluminum layers may be present to improve the strength of wire bonds (See Claims 6 and 7 of the present application). The electronic device is bonded to the die attach pad by a die attach material which may be either a polymer adhesive or a solder (See Claims 8 and 9 of the present application). The copper alloys of the lead frame also have high thermal conductivity to remove heat generated by the device during operation (See Claim 12 of the present application).

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/SG 99/00050

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: **Box V (page 1)**

Therefore the subject matter of dependent claims 2 to 3, 5 to 9 and 12 cannot be considered novel respectively involving an inventive step. Dependent claims 4, 10 and 11 show new features, but no inventive step can be seen.

Documents D2 to D4 describe further prior art lead frames.

Industrial applicability is given.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SG 99/00050

A. CLASSIFICATION OF SUBJECT MATTER

IPC⁷: H 01 L 21/48, 21/50, 23/48, 23/28

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC⁷: H 01 L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI, PAJ, EPODOC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5343073 A (PARTHASARATHI et al.) 30 August 1994 (30.08.94), abstract, page 3, paragraph 2,4,5,6; page 5, paragraph 3; page 6, paragraphs 2,4,5,6; claims.	1-12
A	US 5897339 A (SONG et al.) 27 April 1999 (27.04.99), abstract; claim 1.	1-12
A	JP 10-251777A (KOBE STEEL LTD.) 22 September 1998 (22.09.98) (abstract), [online] [retrieved on 08 March 2000 (08.03.00)]. Retrieved from: EPO WPI-Database, abstract.	1,5
A	US 5418189 A (HEINEN) 23 May 1995 (23.05.95), abstract.	1,5

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

„A“ document defining the general state of the art which is not considered to be of particular relevance

„E“ earlier application or patent but published on or after the international filing date

„L“ document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

„O“ document referring to an oral disclosure, use, exhibition or other means

„P“ document published prior to the international filing date but later than the priority date claimed

„T“ later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

„X“ document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

„Y“ document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

„&“ document member of the same patent family

Date of the actual completion of the international search

08 March 2000 (08.03.00)

Date of mailing of the international search report

29 March 2000 (29.03.00)

Name and mailing address of the ISA/AT
Austrian Patent Office
Kohlmarkt 8-10; A-1014 Vienna
Facsimile No. 1/53424/200

Authorized officer

Mayer

Telephone No. 1/53424/452

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/SG 99/00050

Patent document cited in search report			Publication date	Patent family member(s)			Publication date
US	A	5343073	30-08-1994	AU	A1	34758/93	03-08-1993
				EP	A1	621981	02-11-1994
				EP	A4	621981	17-05-1995
				JP	T2	7503103	30-03-1995
				JP	A2	9172125	30-06-1997
				WO	A1	9314518	22-07-1993
				US	A	5449951	12-09-1995
US	A	5897339	27-04-1999	CN	A	1176489	18-03-1998
				JP	A2	10098147	14-04-1998
				JP	B2	2882780	12-04-1999
JP	A2	10251777	22-09-1998	none			
US	A	5418189	23-05-1995	EP	A1	478250	01-04-1992
				JP	A2	6013502	21-01-1994
				US	A	5227661	13-07-1993

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
7 December 2000 (07.12.2000)

PCT

(10) International Publication Number
WO 00/74131 A1

(51) International Patent Classification⁷: **H01L 21/48**,
21/50, 23/48, 23/28

Singapore 090110 (SG). **STRACK, Helmut** [AT/DE];
Speyererstrasse 6, D-80804 München (DE).

(21) International Application Number: **PCT/SG99/00050**

(74) Agent: **MCCALLUM, Graeme, David**; Lloyd Wise, Tan-
jong Pagar, P.O. Box 636, Singapore 910816 (SG).

(22) International Filing Date: **31 May 1999 (31.05.1999)**

(81) Designated States (*national*): JP, KR, US.

(25) Filing Language: **English**

(84) Designated States (*regional*): European patent (AT, BE,
CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC,
NL, PT, SE).

(26) Publication Language: **English**

(71) Applicant (*for all designated States except US*):
SIEMENS AKTIENGESELLSCHAFT [DE/DE];
Wittelsbacherplatz 2, D-80333 München (DE).

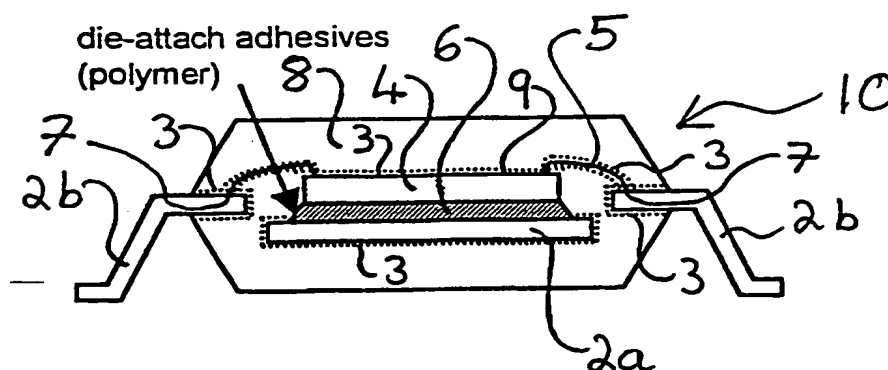
Published:
— *With international search report.*

(72) Inventors; and

(75) Inventors/Applicants (*for US only*): **LEE, Charles**
[SG/SG]; Apt. Blk 110, Bukit Purmei Road #03-152,

*For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.*

(54) Title: A METHOD OF ASSEMBLING A SEMICONDUCTOR DEVICE PACKAGE



(57) Abstract: A method of assembling a semiconductor device package (10) includes first attaching a semiconductor device (4) to a die-pad area (2a) of a leadframe (2). Electrical connections (5) are then formed between electrical contact areas on the semiconductor device (4) and electrical contact areas (7) on the leadframe (2) to form a device/leadframe assembly (2, 4, 5). An adhesion enhancing coating (3) is then deposited on exposed surfaces of the device/leadframe assembly (2, 4, 5) before encapsulating the coated device/leadframe assembly (2, 4, 5) in an electrically insulating material.

WO 00/74131 A1